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CLAIMS					
	NO. OF CLAIMS		EXTRA CLAIMS	RATE	FEE
Basic Application Fee					\$690.00 (101)
Total Claims	40	MINUS 20 =	20	x \$18.00 (103)	360.00
Independent Claims	11	MINUS 3 =	8	x \$78.00 (102)	624.00
If multiple dependent claims are presented, add \$260.00 (104)					-0-
Total Application Fee					1,674.00
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TOTAL APPLICATION FEE DUE					1,674.00

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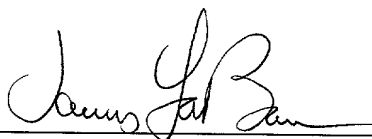
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GRAPHICAL USER INTERFACE FOR COMPUTERS HAVING VARIABLE SIZE ICONS

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention is directed to icons and similar types of graphical objects that are employed in a graphical user interface for computers. More specifically, the present invention is directed to a graphical user interface which displays variable size icons based on various user preferences and/or object characteristics.

2. Description of the Related Art

10 The rapid advance of computer technology has enabled computer programmers to greatly enhance the sophistication of their software programs. Yet, an increase in sophistication often brings an increase in application complexity. Such complexity often serves to confuse and frustrate computer users as they attempt to learn the operation of a new computer application, especially when the software manuals are
15 large and burdensome to use.

 The computer industry has attempted to address the above drawback by designing application programs with user-friendly display interfaces. Generally, the user-friendly paradigm aims to present information in the simplest and most intuitive fashion possible. This may be achieved by organizing information using a series of
20 hierarchical menus or windows. Also, user-friendliness is promoted by including graphical metaphors in the user interface instead of nondescriptive command-line prompts. For example, images of file folders are used to identify containers for storage of information, and graphical depictions of trash containers are employed to assist in the disposal (e.g., deletion) of information.

25 Conventional graphical user interfaces make extensive use of icons within a computer display system. Graphical icons used on display screens in computer systems can represent physical objects in the system, such as storage media and servers, as well

as electronic files that pertain to documents and computer applications selected by a user. The icons present a simple graphical metaphor to users that provide a basic description and/or function of the content of the object represented by the icon. Besides providing access to computer applications and documents, icons can be manually

5 manipulated by a user to perform tasks easily. For example, an icon representing a text document can be selected by a mouse that is manipulated by a user, and be either placed onto another icon representing a word processing application or placed onto an icon of a printer which represents a printing application. Once placed on the printer icon or word processor icon, the document is printed or opened by the word processor,

10 respectively.

Users have been permitted to personalize the graphical user interface, by enabling the user to both create and modify graphical icons for a variety of purposes. For example, facial features such as hair color, skin color and hair style of an icon image representing a human face can be edited. Many different icons can be employed

15 within a computer system to graphically represent the presence of different applications and documents. Many of these icons are only changed slightly with respect to their appearance. An icon image can also change depending upon the status of the document or how the document is currently being employed with the computer system. For example, an object may have one icon image when it is not being used, and another

20 slightly different icon that represents the same object when the object is being accessed or used.

An icon may give the user a basic idea of the functions that are performed by a program represented by the icon or the contents of documents represented by the icon. However, there has been no manner to describe the relative importance of programs or

25 documents represented by icons. While individual labels (i.e., the ability to color icons) can be applied to icons to help classify icons, such categorization still does not provide an intuitive indication of the relative importance of the files or program represented by icons, since the user must remember which color is associated with which category.

To provide some flexibility to the user, the size of all icons in a system can be manually altered. However, currently there are essentially two nominal sizes for icons, typically denoted as small and large. For instance, in the Macintosh Operating System developed by Apple Computer, Inc., a small icon has a 16-by-16 pixel area representation and large icon has a 32-by-32 pixel area representation. A user can alter all icons of a display system from one size to another size based upon his or her preference. For example, if a user wishes to have small icons represented on a display system, he or she can employ a display option to have all icons displayed with 16-by-16 pixel icon sizes. Alternatively, if a user desires, the size of all icons in a display system can be increased to the larger pixel area. A user can change the size of the icons if, for example, hindered eyesight requires larger icons. However, such difference in size does not indicate the relative importance of the files or program represented by the icon, since the change in icon size is performed universally for all icons in a container, such as a folder or window. Accordingly, in order to present a more informative and personalized user interface, a manner of describing to a user relative importance of an icon in relation to other icons in a system is desirable.

SUMMARY OF THE INVENTION

The present invention is directed to a method and associated apparatus for efficiently employing arbitrarily sized icons to represent objects within a display device. To this end, a user's arbitrary sizing of various icons in accordance with the present invention generates icon representations that can advantageously represent categorization of application or file importance, and/or the size of a file represented by an icon.

In accordance with an exemplary embodiment of the present invention, methods and apparatuses for varying the size of a plurality of icons in a window of display system are described which comprise steps and elements for storing icon data representative of a plurality of icon images, receiving a user command to generate icons of varied sizes in the window, and displaying different sized icons within the window.

In accordance with an another exemplary embodiment, methods and apparatuses for varying the size of a plurality of icon images displayed in a display device, based upon a user preference value, comprise steps and elements for storing icon data representative of a plurality of icon images, selecting individual icons to perform icon sizing, designating user preference values for each of the selected icons, generating different sized icons, wherein the different sizes of the icon images are determined based upon the user preference value, and displaying the different sized icon images.

In accordance with yet another exemplary embodiment of the present invention, a method and apparatus for varying a size of a plurality of icons based upon an object characteristic is described, which comprise steps and elements for: storing icon data representative of a plurality of icon images, selecting individual icons to perform icon sizing, determining the object characteristic with respect to each of a plurality of objects associated with the selected individual icons, generating different sized icons representing the objects wherein the size of the icon is determined by the characteristic of the objects, and displaying the different sized icon images representing the plurality of objects.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the present invention will become more apparent from the following detailed description of the invention when read in conjunction with the accompanying drawings wherein like elements are designated by like numerals and wherein:

Figure 1A illustrates a block diagram of hardware components of a computer system of a type in which exemplary embodiments of the present invention can be implemented;

Figure 1B illustrates a block diagram of an operating system implemented in a computer system of a type in which exemplary embodiments of the present invention can be implemented;

Figure 2 illustrates exemplary icon images which might be utilized in embodiments of the present invention;

Figure 3 illustrates a plurality of icons which are sized based upon their relative importance in accordance with an exemplary embodiment of the present invention;

5 Figure 4 illustrates a plurality of icons which are variably sized based upon the number of documents within the folder in accordance with an exemplary embodiment of the present invention;

Figure 5 illustrates one example of a data structure which stores icon data; and

10 Figure 6 illustrates an icon sizing routine in accordance with an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

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15 The present invention will now be described with reference to the accompanying drawings in which graphical icon representations are generated in various sizes. However, this invention is not limited to only the embodiments set forth within this disclosure. Rather, the generation of variable sized graphical icon representations as shown in this disclosure is meant to be exemplary of many other graphical elements whose size can be varied, in any manner, for the purpose of providing information to the user about the objects represented by such elements.

20 Referring to Figure 1A, hardware components of a general computer system, in which the present invention can be implemented, are illustrated. The computer system comprises a display device 4 and various input devices such as a keyboard 5 and mouse 3 in operable connection with a CPU memory 6 and CPU processor 9. Additionally, the system can also include a video card 13 used in the processing of video data

displayed on display device 4. The video card 13 can also include video processor 11 and a video memory 12. While other elements and components are normally attached to the computer system only these elements are shown so as not to obscure the invention.

5 The computer system typically runs in accordance with an operating system, and can execute many different applications and other programs such as word processing programs, accounting programs, and e-mail programs, to name a few. As illustrated in Figure 1B, three specific portions of operating system 14 running on the system illustrated in Figure 1A are the user interface application 7, icon services application 8 and icon sizing application 15. As with the other software programs, these applications
10 are typically stored in a computer-readable medium, such as a magnetic disk, and loaded into either the CPU memory 6 or video memory 12 of the video card 13 of the computer system for execution.

 The user interface application 7 functions to display graphical elements on the display device 4 which can represent computer system objects that can be manipulated
15 by the user, and launches other programs at the request of the user. Referring again to Figure 1A, one type of component of the graphical user interface is an icon 10 which can represent an object such as a disk, documents or a computer application. A user is able, through the manipulation of a mouse 3, to access a program by clicking on the
20 icon which is displayed on the computer display that represents the program. Alternatively, a keyboard can also be used to gain access to the object represented by an icon.

 Icon services 8 is an application that maintains and retrieves icon image data from the video memory or CPU memory 6 and prepares the data for presentation on
25 display device 4. The data can be rendered using either the CPU memory 6 or the video memory 12. However, the placement of the icon data in the video memory and subsequent rendering is performed faster than using CPU memory 6 and CPU processor 9 due to the many other tasks being performed by the CPU processor 9. Icon sizing application 15 functions to receive a user's input indicating how icons are to be sized,

and determines the various sizes of selected icons. The icon services application 8 is able to use this information to size the selected icons.

Figure 2 illustrates exemplary icon images 10 that might be used in display devices of computer systems. Icons 10 are shown which represent various objects such as an application program, a document, an edition, a stationary pad, a query document, a preference item, an operating system extension and a desk accessory program. Typically, the icons are displayed within a window or other type of container object which associates related computer system objects to one another. For instance, icons that represent storage media might be displayed on the desktop. To view the objects stored on a given item of media, such as a hard disk, the user can access the icon associated with that item to open a window, in which icons are displayed that represent the various folders, programs and documents stored on that disk.

In accordance with the present invention, the sizes of various icons, representing objects within particular windows, can be varied relative to one another, to convey information about the objects represented by the icons as well as other informative purposes. Referring to an exemplary embodiment illustrated in Figure 3, window 30 has an upper pane that contains a plurality of icons 31 which can be displayed on display device 4. Each icon 31, representing at least one object, is displayed using a single standard sized icon (e.g., 16-by-16 or 32-by-32). The icon entitled "Docs", highlighted in window 30, contains a plurality of objects that are represented by plurality of icons 32-36, displayed in a lower pane 38 of the window. The icons in either of the panes of the window 30 can be variably sized in accordance with the present invention.

For example, as illustrated in the lower pane 38 of Figure 3, icons located within a specific window can be variably sized based on a characteristic of the objects represented by the icons. Icons 31 located in other panes of the window or in other windows maintain their default size. Alternatively, if a user chooses, the icons 31 located in the upper pane of window 30 can be separately varied in size, according to a user's preference or object characteristics, whether or not the icons in lower pane 38

are varied in size. Many different object characteristics such as the number of files contained within the objects, the object that has been added or amended most recently or the amount of memory utilized by the objects can be used to determine the size of icons within a window.

5 As discussed above, the Figure 3 embodiment shows a window pane 38 containing a plurality of icons 32-36. These icons represent folders defining separate logical areas of memory that contain various documents. In accordance with an exemplary embodiment of the present invention, the number of files located in each object constitutes an object characteristic that can be used to determine the relative sizes
10 of the icons. Hence, by simply comparing the relative sizes of the folder icons, the user can readily determine which folder contains the most documents, and which contains the fewest. When a user wishes to size a plurality of icons based upon an object characteristic, he or she can indicate which folders are to be included in the icon sizing application 15 and the specific object characteristic to be used by the icon sizing
15 application 15, by use of keyboard 5, a mouse 3 or other data input mechanism. As described above, other object characteristics can be utilized to determine the size of an associated icon.

Figure 4 presents a plurality of variably sized icons illustrative of another exemplary embodiment of the present invention. The icons, each representing various
20 objects, are located within a window 40. In this embodiment of the invention, no object characteristic is employed to determine an icon's size. Instead, the user can arbitrarily size each icon or icon grouping individually according to the user's desires. Specifically, a user can select an icon or a group and indicate or input the size of the icon or grouping of icons.

25 Alternatively, a user can indicate through the application of a user preference value which icon(s) he/she desires to be the largest, next largest and so forth. For instance in Figure 4, icon 42 labeled "BBEdit 5.0" has been chosen to be the largest icon in the group. Next the user can indicate that he/she desires icon 44 labeled "Read Me" to be the second largest icon within the window 40.

Additionally, a user can designate one user preference value for a plurality of grouped icons to be sized accordingly. Specifically, icons 46 and 48 labeled "BBEdit Startup Items" and "BBEdit FTP Temp", respectively, illustrate multiple icons that are grouped and sized equally. This is also shown for the smallest icons 50-57 illustrated in Figure 4. Once the user has chosen the relative size of each of the icons that are to be sized, the icon sizing application 15 calculates the relative size of each icon to be displayed on display device 4.

Every object that is stored within the computer system has associated data that determines the manner in which it is graphically represented by the user interface. Figure 5 illustrates one example of a data structure that can be used to store this information. Each object has a unique identifier 60, such as a numerical value, and is associated with a container 62 in which it is logically stored. For instance, the container could be the desktop of the user interface, a storage medium in the computer system, or a folder stored within that medium. When a container or folder is opened, a window is displayed, and the icons associated with that container are displayed in the window at respective location 64. An icon's location may be indicated by a pair of x and y coordinates that indicate the location of the center or upper left corner of the icon, relative to a reference point on the window, e.g. its upper left corner. The icon is displayed as a designated image 66, and with label or name 68, which might be chosen by the user.

In accordance with the invention, the data that is stored for an icon also includes sizing information. A first field 70 indicates whether the icon is to have sizing applied to it, and if so how the sizing is determined. For instance, a value of zero in this field might indicate that the default value for the computer system, or the container's window, is to be employed. A value of one could indicate that variable sizing is carried out in accordance with an object characteristic, and a higher value might indicate that a user-designated value is to be employed for variable sizing. For instance, a value of 2 can indicate that the user value designates relative sizes for the icons, whereas, a value of 3 might indicate that the user has designated the absolute size to be utilized.

If any of the variable sizing options are chosen, the value in a second field 72 indicates the size for the icon. If the option for a user designated size is selected, the value in the second field 72 is determined by the user. For instance, in the example of Figure 5, the document objects represented in the second and third data columns, which are both located in "Folder 1", have a sizing value of "2", which means that their icons are displayed according to user-designated relative sizes. The relative size value of the object in the second column, named "Doc1", is 1 which indicates that it's icon will be displayed with the largest size. Since "Doc2" has a relative sizing value of "2", it will be displayed at the next largest size.

In contrast, the object represented in the last column of the exemplary table, "Doc1" in "Folder 10", has a sizing value of 3, which means that it is displayed at a user-designated absolute size. In this case, the user has specified a value of 57, so that the icon image is scaled to a size of 57x57 pixels.

If the sizing is to be carried out in accordance with an object characteristic, the field 72 can contain a value which identifies the type of characteristic that is to be used, e.g. number of items, modification date, etc. Alternatively, it can contain the actual value for the characteristic, as shown for the example in the fourth data column of Figure 5. For instance, if the chosen characteristic is number of objects in a container, that number can be reflected in the "Value" field 72, e.g. 78 files.

As illustrated in Figure 6, the icon sizing application 15 can be invoked when a user desires to vary the relative size of icons displayed on the display device 4. In step 510, when a user wishes to change the size of icons, the icon sizing application is opened, for instance by means of an operating system level command or a control panel. Once the application is opened, in step 515, a user is able to choose the manner in which icons are able to be sized.

If a user desires to have icons sized based upon an object characteristic (discussed with respect to Figure 3), in step 520, the sizing application requests the user to indicate the icons to be sized, within a window, and the object characteristic to be used in the sizing of the icons. The icon sizing application 15 searches the objects

associated with the selected icons and determines a value for the required object characteristic. This value can be stored in the data field 72. In step 525, the processor performs a sort function to order respective icon images of associated objects based upon the object characteristic. In step 530, the icons representing the objects having the
5 two extreme values for the object characteristic are assigned a maximum icon size (e.g., 128-by-128 pixel area) and minimum size (e.g., 16-by-16 pixel area), respectively.

In step 535, the remaining intermediate icon images are sized in direct proportion to the minimum and maximum preferences determined by the sorting routine. For example, referring to Figure 3, if the maximum sized folder (128-by-128 pixel area) has 100 documents and the minimum sized folder (16-by-16 pixel area) has
10 10 documents, then a folder containing 55 documents would have a size of 72-by-72 pixel area.

In another facet of the present invention, if an object characteristic changes (e.g., the number of documents increases or decreases), the icon image representing the
15 object in the display device 4 can be dynamically revised to represent the changed characteristic of the object. It should be noted that the specific maximum and minimum sizes of icon images are merely exemplary. The maximum and minimum size for icons can also be chosen via user input in addition to system requirements/limitations.

On the other hand, in step 515, the user can choose to designate icon sizes. In
20 this case, at step 537, the user can choose further either the relative size of icons or can arbitrarily size icons. In step 540, if a user desires to choose the relative size of each icon within a window as a preference item (discussed with respect to Figure 4), the sizing application requires the individual to choose an order of icons and their relative sizes. For example, a user can sequentially choose icons by selecting the icons (either
25 via keyboard or mouse) in a desired order. The icon sizing application will then save the sequential order in which the icons were selected in the field 72 and next determine the relative sizes of each icon, dependent upon the size of the maximum and minimum icons and the number of icons to be sized. Alternatively, the user can manually choose an icon and manually input a number indicating the relative ranking of the icons.

icons and the number of icons to be sized. Alternatively, the user can manually choose an icon and manually input a number indicating the relative ranking of the icons.

In step 545, the processor sorts icon images according to the given user preference value and assigns the maximum icon size (MAX) and minimum icon size (MIN) allowable to the icon images with the highest user preference value and lowest user preference value, respectively. In step 550, once the maximum and minimum sizes are ascertained, an image size gap is calculated to provide an equal size gap between icon image sizes, as follows:

$$\text{Image Size Gap} = (\text{MAX} - \text{MIN})/(\text{N}-1),$$

where N is equal to the number of variable sizes chosen by the user.

As an example, using the four size differences discussed with respect to Figure 4 and a maximum and minimum icon image size of 16-by-16 and 128-by-128, respectively an icon image size gap of 37.33 pixels is calculated. Since an icon size employing fractional pixels is not practical, the size of the icon is rounded, either up or down, to the nearest whole pixel value (i.e., in this case, either 37 or 38). In step 580, once the proper size gap between the icons is calculated, the icons are assigned a corresponding size and displayed.

Referring back to step 537, the user can decide not to choose a relative size of icons, but rather individually choose the absolute size of specific icons. In step 557, the individual can select an icon or a group of icons and specifically input an icon size for the icon(s).

In step 560, once the variable icon sizes have been determined, the icon data associated with the icons is retrieved from the video memory 12 or CPU memory 6 by the icon services application 8. The icon image data can be stored in memory in several different ways. For example, instead of storing data for only a 16-by-16 icon image representation, data for multiple icon representations (e.g., 16-by-16, 64-by-64 and 128-by-128) icon images can be stored. The video processor 11 or CPU processor 9

can then retrieve icon data from memory having the size that is the closest to the icon data to be displayed and scale the data accordingly to obtain the icon image size needed. This allows for better image display than merely having one icon image representation for all possible icon image sizes. In step 565, the icon image data, if not the exact size
5 needed for display, is then sized by the CPU to the size to be displayed. Finally, in step 570, the different sized icons are rendered and displayed on the display device 4.

Accordingly, the use of the icon sizing application 15 in accordance with the present invention provides a way for a user to indicate preferences with respect to individual icons or individual groupings of icons. By having display system size icons based either upon a specific user preference and/or user-chosen object characteristic, a more intuitive graphical user interface can be employed in computer systems.

It will be appreciated by those of ordinary skill in the art that the present invention can be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The presently disclosed embodiments are therefore considered in all respects to be illustrative and not restrictive. The scope of the invention is indicated by the appended claims rather than the foregoing description, and all changes that come within the meaning and range of equivalence thereof are intended to be embraced therein.

CLAIMS

1. A method for varying the size of a plurality of icon images displayed in a display device based upon a user preference value, said method comprising the steps of:
 - storing icon data representative of a plurality of icon images;
 - selecting individual icons to perform variable icon sizing;
 - 5 designating user preference values for each of the selected icons;
 - generating icon images of different respective sizes, wherein the different sizes of the icon images are based upon said user preference value; and
 - displaying said different sized icon images.
2. The method for varying the size of a plurality of icons of claim 1, wherein said generating step further comprises:
 - sorting icon images into an order based upon said designated preference values.
3. The method for varying the size of a plurality of icons of claim 2, wherein said generating step further comprises:
 - calculating a size gap between said ordered icon images using the following equation:

$$(\text{max-min}) / (N-1),$$
 where N is the number of applications given a preference, min is a minimum icon size and max is a maximum icon size.
4. The method for varying the size of a plurality of icons of claim 1, wherein said icon images of different respective sizes are located within a window.

5. The method for varying the size of a plurality of icons of claim 1, further comprising the step of:

retrieving said icon image data from memory and scaling said icon image data in preparation for display on said display device.

6. A computer readable medium containing program instructions to:
store icon data representative of a plurality of icon images;
detect the selection of individual icons;
obtain user preference values for each of the selected icons;
generate icon images of different respective sizes, wherein the different sizes of the icon images are based upon said user preference value; and
display said different sized icon images.

7. The computer readable medium of claim 6, further comprising instructions to:

sort icon images into an order based upon said designated preference values.

8. The computer readable medium of claim 7, further comprising instructions to:

calculate a size gap between adjacent icon image sizes using the following equation:

$$(\text{max}-\text{min}) / (N-1),$$

where N is the number of applications given a preference, min is the minimum icon size and max is the maximum icon size.

9. The computer readable medium of claim 6, wherein said different sized icon images are located within a window.

10. The computer readable medium of claim 6, further comprising instructions to:

retrieve said icon image data from memory and scale said icon image data in preparation for display.

11. An apparatus for varying a size of a plurality of icons images displayed in a window of a display device based upon a user preference value, said method comprising the steps of:

means for storing icon data representative of a plurality of icon images;
 means for selecting individual icons for variable icon sizing;
 means for designating user preference values for each of the selected icons;
 means for generating icon images of different respective sizes, wherein the different sizes of the icon images are based upon said user preference value; and
 display means for displaying said different sized icon images.

12. The apparatus for varying a size of a plurality of icons of claim 11, wherein said generation step further comprises:

sorting means for sorting icon images into an order based upon said designated preference values.

13. The apparatus for varying a size of a plurality of icons of claim 12, wherein said generating means further comprises:

calculating means for calculating a size gap between adjacent icon image sizes using the following equation:

$$(\text{max}-\text{min}) / (N-1),$$

where N is the number of applications given a preference, min is the minimum icon size and max is the maximum icon size.

14. The apparatus for varying a size of a plurality of icons of claim 11, wherein said different sized icon images are located within a window.

15. The apparatus for varying a size of a plurality of icons of claim 11, further comprising:

retrieving means for retrieving said icon image data from memory and scaling said image data for display.

16. A method for varying the size of a plurality of icons based upon an object characteristic, comprising the steps of:

storing icon data representative of a plurality of icon images;

selecting individual icons for variable icon sizing;

5 determining said object characteristic with respect to each of a plurality of objects respectively associated with said selected individual icons;

generating icon images of different respective sizes representing said objects, wherein the size of an icon is determined by said object characteristic; and

10 displaying said different sized icon images representing said plurality of objects.

17. The method for varying the size of a plurality of icons of claim 15, wherein said generation step further comprises:

sorting icon images into an order based upon said object characteristic.

18. The method for varying the size of a plurality of icons of claim 17, wherein said generation means further comprises:

determining the size of said icon by:

associating a maximum sized icon image with an object having one extreme value for the object characteristic;

20 associating a minimum sized icon image with an object having another
 extreme value for the object characteristic; and
 assigning sizes to the remainder of said icon images with objects, in
 proportion to the objects associated with the maximum and minimum sized icons.

25 19. An apparatus for varying the size of a plurality of icons based upon an
 object characteristic, comprising the steps of:
 storing means for storing icon data representative of a plurality of icon
 images;
 selecting means for selecting individual icons to perform variable icon
 sizing;
 30 determining means for determining said object characteristic with respect
 to each of a plurality of objects associated with said selected individual icons;
 generating means for generating different sized icons representing said
 objects wherein said size of said icon is determined by said object characteristic of said
 objects; and
 35 displaying means for displaying said variable sized icon images
 representing said plurality of objects.

20. The apparatus for varying the size of a plurality of icons of claim 19,
 wherein said generation step further comprises:
 sorting means for sorting icon images into an order based upon said object
 40 characteristic.

21. The apparatus for varying the size of a plurality of icons of claim 19,
 wherein said generation means further comprises:
 determining means for determining the size of said icon by:
 associating a maximum sized icon image with an object having one
 45 extreme value for the object characteristic;

associating a minimum sized icon image with an object having another extreme value for the object characteristic; and

assigning sizes to the remainder of said icon images, in proportion to the objects associated with the maximum and minimum sized icons.

50 22. A computer readable medium containing program instructions to:
store icon data representative of a plurality of icon images;
detect the selection of individual icons;
determine said object characteristic with respect to each of a plurality of
objects respectively associated with said selected individual icons;
55 generate different sized icons representing said objects wherein the size
of an icon is determined by said object characteristic; and
display said different sized icon images representing said plurality of
objects.

60 23. A computer readable medium of claim 22, further containing program
instructions to:
sort icon images into an order based upon said object characteristic.

24. A computer readable medium of claim 22, further containing program
instructions to:
determine the size of an icon by:
65 associating a maximum sized icon image with an object having one
extreme value for the object characteristic;
associating a minimum sized icon image with an object having another
extreme value for the object characteristic; and
assigning sizes to the remainder of said icon images, in proportion to the
70 objects associated with the maximum and minimum sized icons.

25. A method for varying the size of a plurality of icons images displayed in a container of a display device based upon a user preference value, said method comprising the steps of:

- 75 storing icon data representative of a plurality of icon images;
designating a user preference value for at least some of the plurality icon images located within the container;
generating different sized icon images, wherein the different sizes of the icon images are based upon said user preference value; and
displaying said different sized icon images.

26. The method for varying the size of a plurality of icons of claim 25, wherein said generation step further comprises:

sorting icon images into an order based upon said preference values.

27. The method for varying the size of a plurality of icons of claim 26, wherein said generating step further comprises:

calculating a size gap between said ordered icon images using the following equation:

$$(\text{max}-\text{min}) / (N-1),$$

where N is the number of applications given a preference, min is the minimum icon size and max is the maximum icon size.

28. The method for varying the size of a plurality of icons of claim 25, wherein said container is a window.

29. The method for varying the size of a plurality of icons of claim 25, further comprising the step of:

retrieving said icon image data from memory and scaling said icon image data in preparation for display on said display device.

30. A method for displaying a plurality of icons in a window on a display device, comprising the steps of:

storing icon data representative of a plurality of icon images;
receiving a user command to display icons of varied sizes in said window; and
displaying said icons with different relative sizes within said window.

31. The method of claim 30, wherein the different sizes of said icons are based upon an object characteristic.

32. The method of claim 30, wherein the different sizes of said icons are based upon a user preference value given to each of said icons.

33. A method for varying the size of a plurality of icon images displayed in a display device based upon a user designated size, said method comprising the steps of:

storing icon data representative of a plurality of icon images;
selecting individual icons to perform variable icon sizing;
designating a different respective icon size for each of the selected icons;
generating icon images at sizes based on said designations; and
displaying said different sized icon images.

34. The method of claim 33, wherein said different sized icon images are located within a window.

35. The method of claim 33, wherein said designating step comprises the indication of relative sizes for the selected icons.

36. The method of claim 33, wherein said designating step comprises the indication of absolute sizes for the selected icons.

37. An apparatus for varying a size of a plurality of icon images displayed in a display device based upon a user designated size, comprising:

- means for storing icon data representative of a plurality of icon images;
- means for selecting individual icons to perform a variable icon sizing;
- means for designating an icon size for each of the selected icons;
- means for generating icon images at a size based on said designation; and
- means for displaying said different sized icon images.

38. The apparatus of claim 37, wherein said different sized icon images are located within a window.

39. A computer readable medium for varying the size of a plurality of icon images displayed in a display device based upon a user designated size, comprising instructions to:

- store icon data representative of a plurality of icon images;
- detect the selection of individual icons;
- designate a respective icon size for each of the selected icons;
- generate icon images at sizes based on said designations; and
- display said different sized icon images.

40. The computer readable medium of claim 39, wherein said different sized icon images are located within a window.

Abstract of the Disclosure

A computer user interface is provided which allows a user to adjust the size of icons based upon a user's preference or based upon a characteristic of the objects that the icons represent. When the icon sizing is performed according to a user preference, a relative sizing scheme or an arbitrary icon sizing scheme can be employed to variably
5 size icons. Providing the ability to size icons in such a manner allows users to represent a user's categorization of object importance, for example.

005070" 9008/460

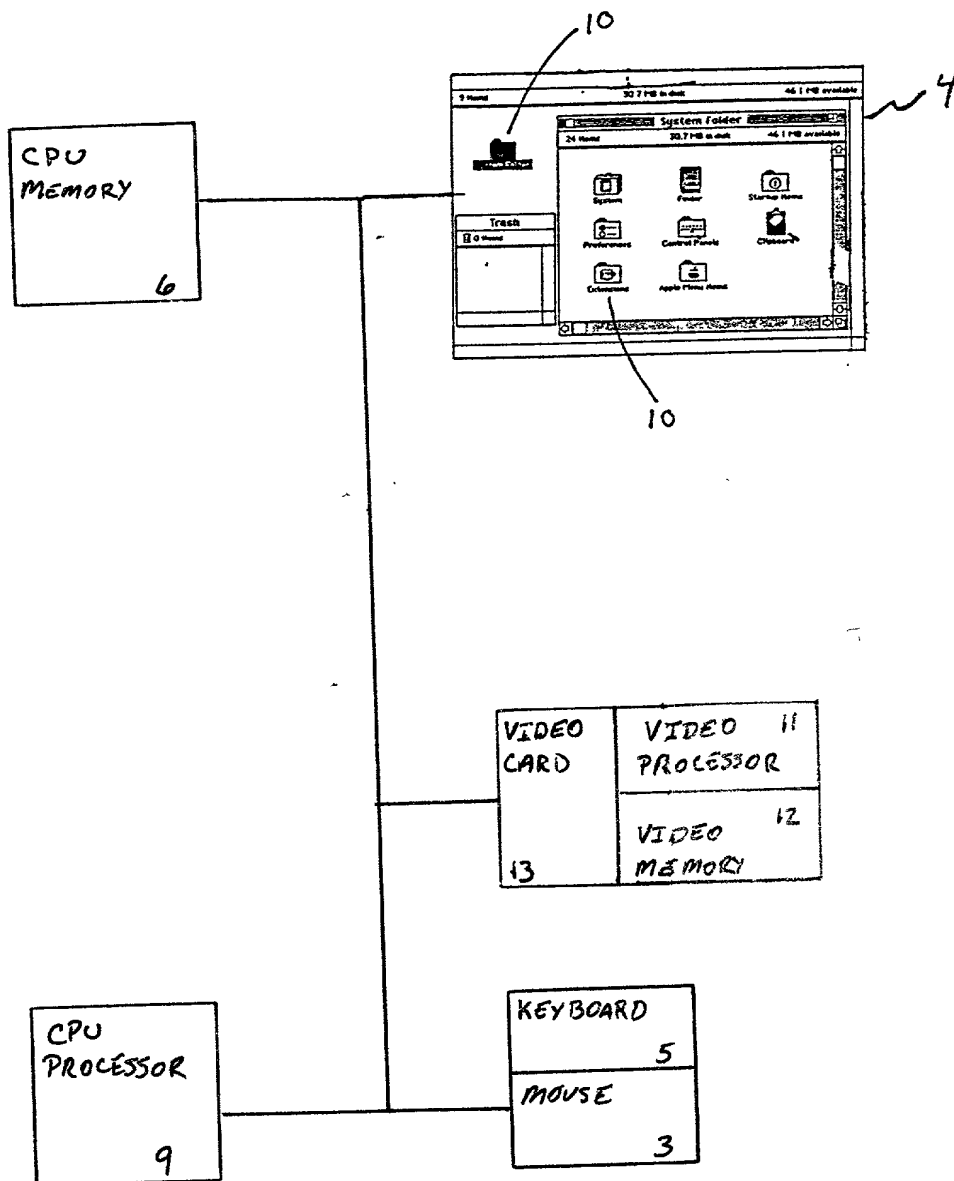


FIGURE 1A

005070 00027460

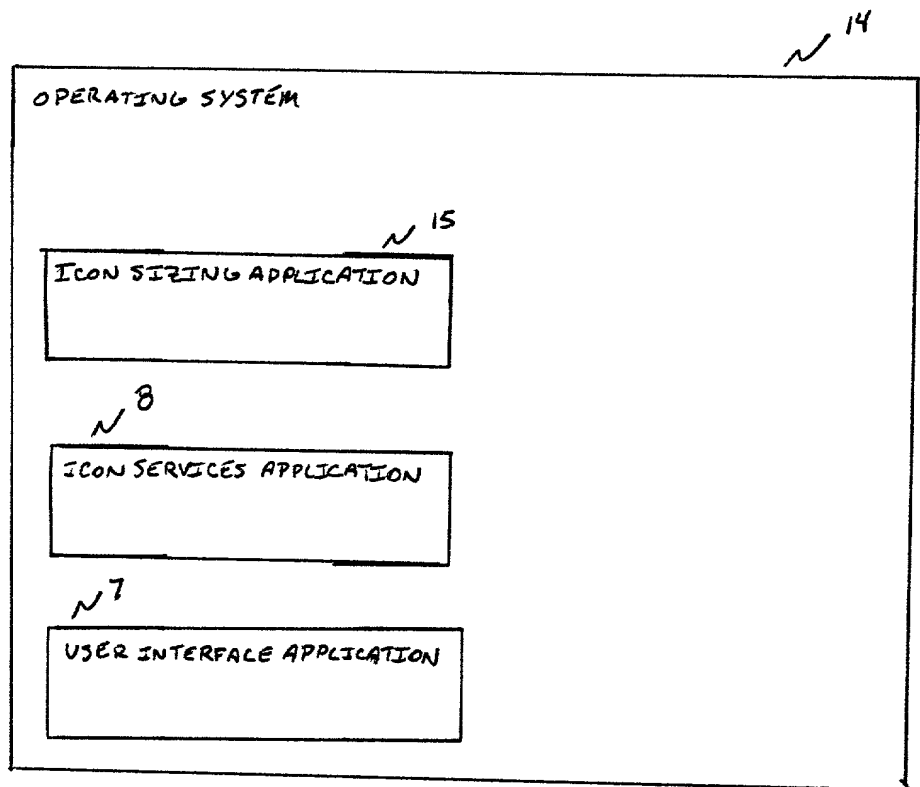


FIGURE 1B

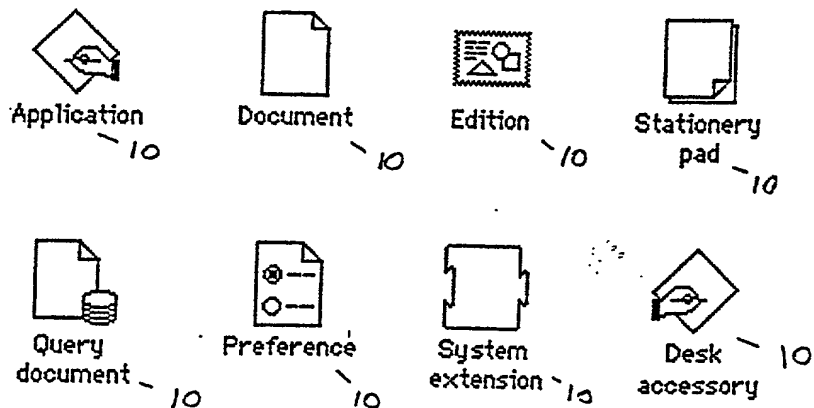


FIGURE 2

60	OBJECT ID	0173958	6974031	1359784	2846935	4372518
62	CONTAINER	Desktop	Folder1	Folder1	Disk2	Folder10
64	LOCATION	128, 75	12, 28	42, 28	6, 6	14, 44
66	IMAGE	Folder	Document	Document	Folder	Document
68	NAME	Folder1	Doc1	Doc2	Docs	Doc1
70	SIZING	0	2	2	1	3
72	VALUE		1	2	78	57

FIGURE 5

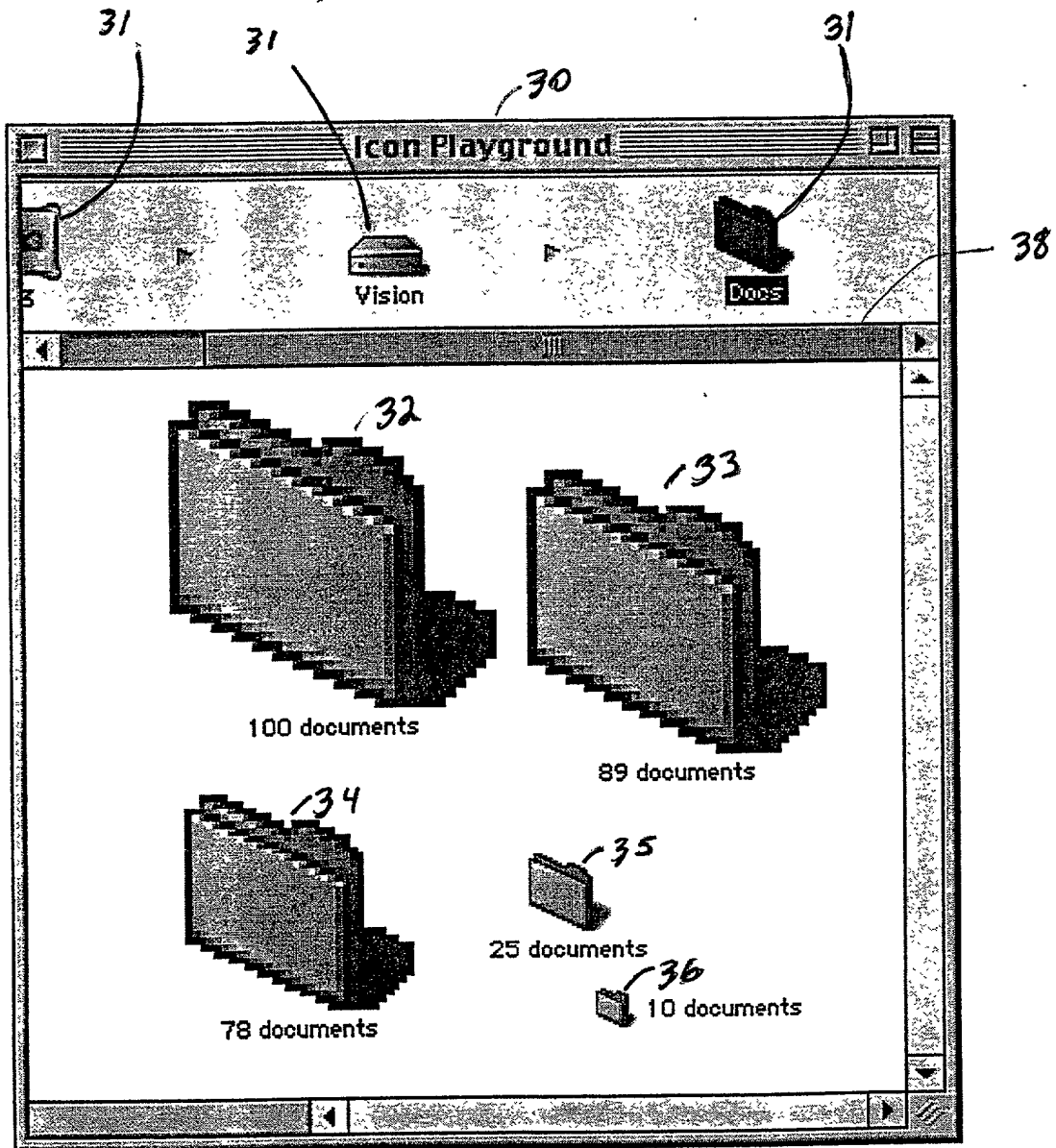


FIGURE 3

005070" 90087460

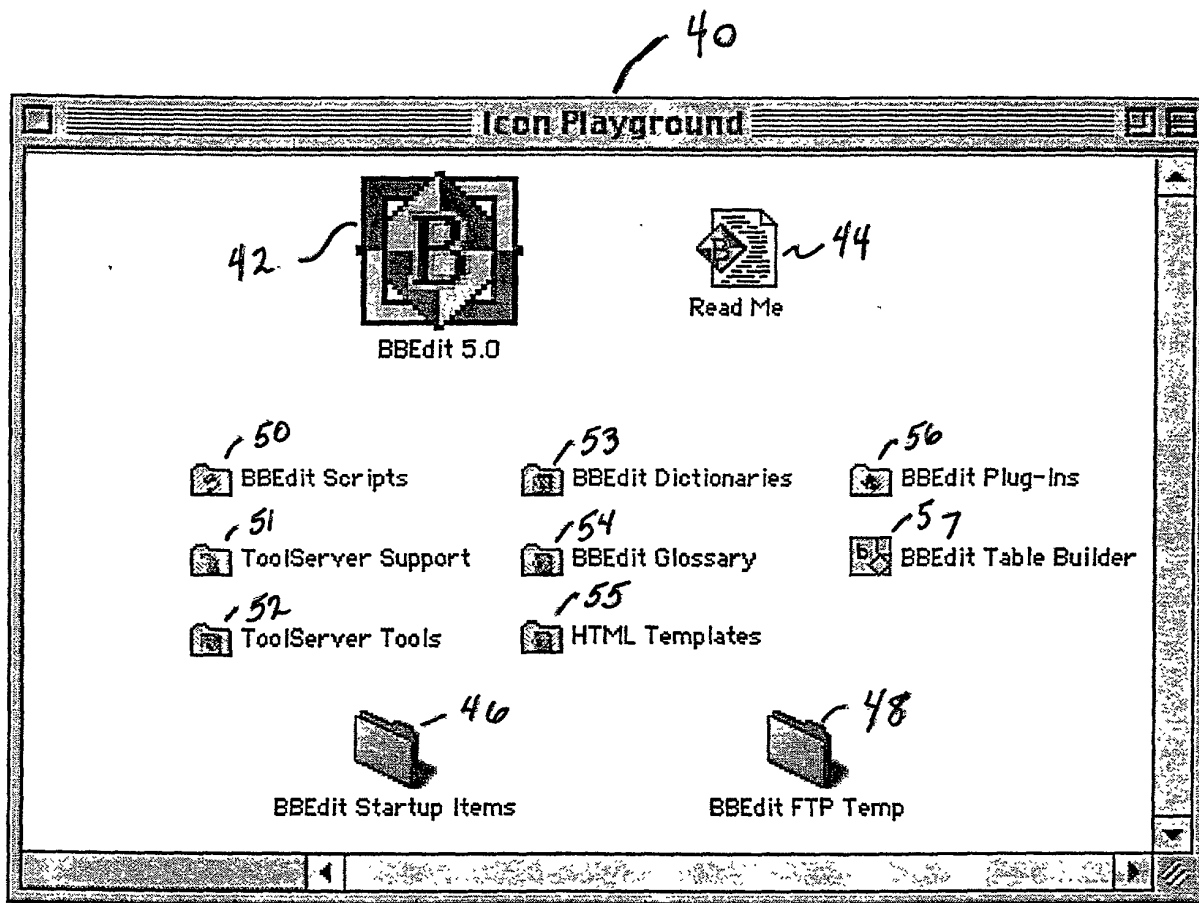


FIGURE 4

005070-90087460

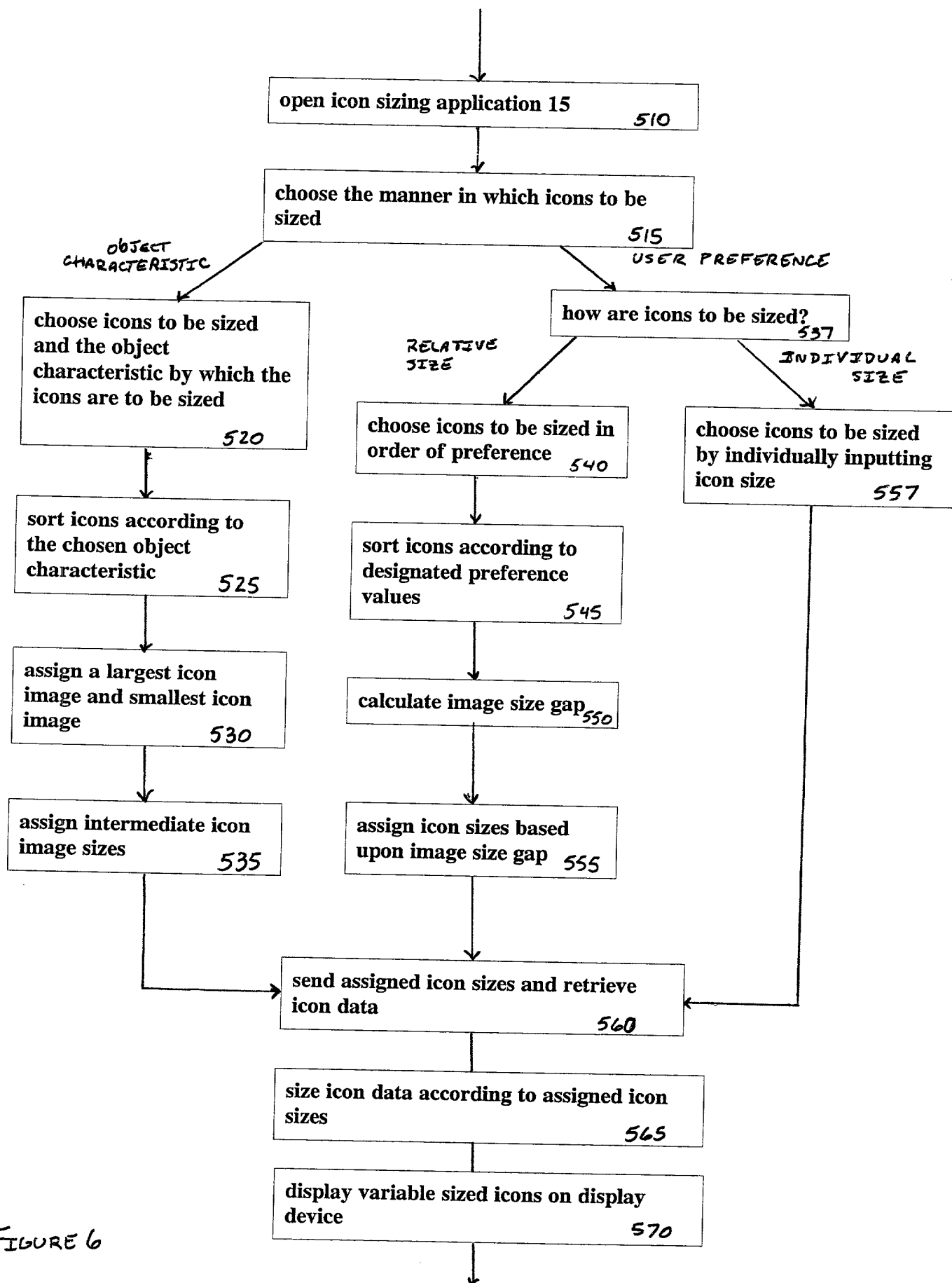


FIGURE 6

**COMBINED DECLARATION AND POWER OF ATTORNEY
FOR UTILITY PATENT APPLICATION**

Attorney's Docket No.

P2413-515

As a below-named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I BELIEVE I AM THE ORIGINAL, FIRST AND SOLE INVENTOR (if only one name is listed below) OR AN ORIGINAL, FIRST AND JOINT INVENTOR (if more than one name is listed below) OF THE SUBJECT MATTER WHICH IS CLAIMED AND FOR WHICH A PATENT IS SOUGHT ON THE INVENTION ENTITLED:

GRAPHICAL USER INTERFACE FOR COMPUTERS HAVING VARIABLE SIZE ICONS

the specification of which

(check one)

☒ is attached hereto;

☐ was filed on _____ as

Application No. _____

and was amended on _____;
(if applicable)

I HAVE REVIEWED AND UNDERSTAND THE CONTENTS OF THE ABOVE-IDENTIFIED SPECIFICATION, INCLUDING THE CLAIMS, AS AMENDED BY ANY AMENDMENT REFERRED TO ABOVE;

I ACKNOWLEDGE THE DUTY TO DISCLOSE TO THE OFFICE ALL INFORMATION KNOWN TO ME TO BE MATERIAL TO PATENTABILITY AS DEFINED IN TITLE 37, CODE OF FEDERAL REGULATIONS, Sec. 1.56 (as amended effective March 16, 1992);

I do not know and do not believe the said invention was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to said application; that said invention was not in public use or on sale in the United States of America more than one year prior to said application; that said invention has not been patented or made the subject of an inventor's certificate issued before the date of said application in any country foreign to the United States of America on any application filed by me or my legal representatives or assigns more than twelve months prior to said application;

I hereby claim foreign priority benefits under Title 35, United States Code Sec. 119 and/or Sec. 365 of any foreign application(s) for patent or inventor's certificate as indicated below and have also identified below any foreign application for patent or inventor's certificate on this invention having a filing date before that of the application(s) on which priority is claimed:

005070-90027460

COMBINED DECLARATION AND POWER OF ATTORNEY

Attorney's Docket No.

P2413-515

COUNTRY/INTERNATIONAL	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED
			YES_ NO_
			YES_ NO_

I hereby appoint the following attorneys and agent(s) to prosecute said application and to transact all business in the Patent and Trademark Office connected therewith and to file, prosecute and to transact all business in connection with international applications directed to said invention:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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